31—33. S. rugosa est S. Smithiana, *Koch.*
34. S. rugosa ? var. stipularis = S. holosericea, *Willd.* Mihi gratissima est; plantam fœmineam antea nondum vidi.
35. S. ferruginea, *And.*, folia—S. holosericea, *Willd.*, valde similis, sed incompleta.
36. S. ferruginea var. = Quoad folia et amenta valde affinis S. Smithianæ, *Koch*, sed tamen distincta videtur. Ab icone in Eng. Bot. Suppl. t. 2665. præter squamas rotundatas non distinguenda.
37. S. acuminata = An revera S. acuminata, *Sm.* ? quæ ad sectionem S. viminalis pertinet ? Amenta desunt. An forsan varietas S. cinereæ ?
38—42. Omnes formæ et varietates S. cinereæ, *L.*
43. Salix—an S. aquatica ? Longe diversa, est sine dubio forma S. laurinæ, *Sm.*, confer amenta. Eandem plantam ex hort. bot. Berolinensi, et ex Silesia possideo.
44. S. oleifolia, *Sm.* ? = Pro var. S. cinereæ, *L.*, habeo, sed amenta non vidi.
45. S. aurita, *L.* = Forma sylvatica apud nos frequens.
46, 47. S. aurita, *L.* !
48, 49. S. reticulata et S. herbacea.

W. Sonder.

Hamburg, March 19, 1844.

Mr. Van Voorst has just published a very useful "Catalogue of British Vertebrated Animals, the names derived from Bell's British Quadrupeds and Reptiles and Yarrell's British Birds and Fishes: so printed as to be available for Labels." The label consists of the English and Latin names and a reference to the volume and page of the excellent works above-mentioned.

Preparing for Publication.

A History of Infusoria, Living and Fossil: arranged according to "Die Infusionsthierchen" of C. G. Ehrenberg. By Andrew Pritchard, M.R.I.

Microscopic Illustrations of Living Objects, with Researches concerning the Methods of Constructing Microscopes, and Instructions for using them. To which is added, a Supplement on the Verification of Microscopic Phænomena, and an Exact Method of Testing Microscopes. By C. R. Goring, M.D. By Andrew Pritchard, M.R.I. Third Edition.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

March 21, 1844.—"A description of certain Belemnites, preserved, with a great proportion of their soft parts, in the Oxford clay at Christian Malford, Wilts." By Richard Owen, Esq., F.R.S., &c.,

Hunterian Professor of Anatomy and Physiology in the Royal College of Surgeons.

The author describes, in the present paper, specimens of Belemnite, discovered in the Oxford-clay at Christian Malford, Wilts, and which are remarkable for the preservation of many of the soft parts of the animal. After alluding to the various opinions promulgated by different authors respecting the nature and affinities of this extinct animal, he adverts more especially to the discovery of the ink-bag of the Belemnite, which was published in the Zoological Transactions, vol. ii., and in the Cyclopædia of Anatomy and Physiology (Art. Cephalopoda). This discovery led him, on the strength of deductions from the physiological relations of this organ, to remove the Belemnite from the *Polythalamacea* of De Blainville, and place it in the higher order of the naked Cephalopods.

The structure of the shell is next discussed, and the spathose dart, or guard, is proved to be the result of original organization, both by its microscopic structure and by the fact that the chambers of the phragmocone have not been infiltrated by mineral substance in any of the specimens described: the name *phragmocone* being applied to the chambered and siphonated conical division of the compound shell of the Belemnite; and the term *alveolus* being restricted, in the present paper, to the socket or cavity at the base of the guard, in which the phragmocone is lodged. A detailed description is given of the sheath of the phragmocone and of the structure of the chambers. The state of preservation of the present specimens has enabled the author to describe the form and extent of the mantle—its continuation over the exterior of the shell, and the arrangement of its muscular fibres. The animal is provided with two lateral fins of a semi-oval figure, which are attached to the middle of the mantle, in advance of the spathose dart.

The muscular fibres of the fins, the infundibulum and its muscles are next described; and also the head, the eyes, which are large and sessile, and the cephalic arms, which are eight in number; together with traces of two slender superadded tentacula. The ordinary arms are furnished with a double alternate row of sharp horny hooks, as in some existing species of *Onychoteuthis*, but the arms are relatively longer. Their muscular structure is traced in the fossil specimens, and compared with that in the recent Decapoda. The ultimate, or primitive fibres of the muscles of the Belemnite agree in size with those in the *Onychoteuthis*; but the character of the transverse striæ, which is feebly developed in the primitive muscular fibre of the Cephalopods, is not preserved in the fossil. Of the interior organs of the Belemnite, besides the ink-bag and duct, which had been before discovered by Drs. Buckland and Agassiz, the remains of the horny lining of the gizzard are preserved in the present fossils.

Thus the deduction that the higher, or dibranchiate type of Cephalopodal organization is necessarily associated with the presence of the atramental apparatus, is established by the demonstration, in these fossil Belemnites, of a fleshy mantle, inclosing the shell, and provided with a pair of muscular fins, of large and sessile eyes, and of few, but large and complex cephalic arms.

The author concludes by pointing out the more immediate affinities of the Belemnites, and showing that it combines characteristics which are now divided amongst distinct genera: as, for example, first, a complex internal shell, divisible into the same principal parts as that of the *Sepia*, but one of which has, secondly, the same essential chambered structure as the shell of the *Spirula*; thirdly, uncinated cephalic arms, as in the *Onychoteuthis*; and lastly, an advanced position of rounded fins, as in the *Spirula* and *Rossia*.

The paper is illustrated by drawings of the specimens described, with microscopic views of the shell and muscular tissue, and a restoration of the Belemnite according to the data afforded by the present fossils.

June 20.—"On the Structure of the Ultimate Fibril of the Muscle of Animal Life." By Erasmus Wilson, Esq., Lecturer on Anatomy and Physiology in the Middlesex Hospital; in a Letter addressed to Peter Mark Roget, M.D., Sec. R.S. Communicated by Dr. Roget.

By resorting to peculiar methods of manipulation, and employing a microscope of more than ordinary power, the author, with the assistance of Mr. Lealand, has succeeded in discovering the real structure of the ultimate muscular fibril, in a specimen taken from the arm of a strong healthy man immediately after its amputation. He finds each fibril to be composed of minute cells, disposed in a linear series, flattened at their surfaces of apposition, and so compressed in the longitudinal direction as to leave no marginal indentation on the surface; thus constituting a uniform cylinder, divided into minute subdivisions by transverse septa, which are formed by the adherent surfaces of contiguous cells. The diameter of the fibril, in the state of relaxation, is the 20,000th part of an inch. The cells are filled with a transparent substance, to which the author gives the name of *Myoline*, and which differs in its refractive density in different cells. In four consecutive cells the myoline is of greater density than in the four succeeding cells, and this alternation is repeated throughout the whole course of the fibril. In consequence of all the fibrils composing the ultimate fasciculus having the same structure, and the cells, which are in lateral juxtaposition, containing myoline of the same density, they act similarly on light, and the whole presents, to the eye of the microscopic observer, a succession of striæ or bands, dark and luminous alternately, and transverse to the direction of the fasciculus; an appearance which has been noticed by preceding observers, but of which the cause had not hitherto been ascertained. A dark stria may occasionally appear as a luminous one, and *vice versâ*, when viewed by light transmitted at different degrees of obliquity.

The structure here described, the author remarks, reduces the muscular fibre to the simple type of organization exhibited in the combination of a series of cells, associating it with other tissues of cell formation, and will probably, he thinks, open new sources of explanation of the immediate agency of muscular action, a power hitherto involved in the deepest mystery.

"On the Reproduction of lost parts in Myriapoda and Insecta."

By George Newport, Esq., F.R.C.S., President of the Entomological Society of London, and Corresponding Member of the Philomathic Society of Paris. Communicated by P. M. Roget, M.D., Sec. R.S.

It has long been known that the limbs of Crustacea and Arachnida, accidentally lost or designedly removed, are, in course of time, replaced by the growth of new limbs; and the same power of reproduction has been stated to have been observed in the Phasmæ, insects which undergo neither metamorphosis nor any change of habits. But whether such a power exists in those insects, such as the Lepidoptera, which undergo a complete metamorphosis, changing not only their form, but also their food and mode of life, in passing from the larva to the adult state, has been considered as very doubtful. The instances in which the reproduction of lost parts appeared to have occurred in some of the Myriapoda, were attributed to imperfect or arrested development. With a view to determine these unsettled points, the author commenced, in the summer of 1841 and 1842, a series of direct experiments on this subject in the Myriapoda; and in the present summer he has extended them to the Lepidoptera. The results of his labours are given in the present memoir.

In some specimens of Iulus, from which he had removed the antennæ and some of the legs, the lost organs were found to be completely reproduced after the next change of integument; differing from the original organs only in their smaller size, and the incomplete development of some of their minuter parts. The same results followed from similar experiments made on the Lithobris during the earlier periods of its growth. One individual of this genus, which had already acquired the tenth pair of legs, was by accident deprived of the eighth, ninth and tenth pair; at the next change of skin it not only developed two additional pair of legs, but also reproduced the three pair which had been lost. Some time after this it again lost one of the legs of the twelfth pair; a loss which was repaired at the next change by the growth of a new leg, while those previously reproduced acquired an increase of size.

The first observation which led the author to believe that true insects might possess the power of reproducing lost parts, was that of a specimen of Phasma in the collection at the British Museum, in which the right anterior leg had evidently been reproduced. He then instituted a series of experiments on the larva of the *Vanessa urticæ*, or common nettle butterfly, which belongs to the order Lepidoptera, and undergoes complete metamorphosis. He removed some of the true legs of the larva, sometimes in their tibial portion, and sometimes at their base: in the first case, parts similar to those removed were invariably reproduced in different states of development, and in the latter, entire new limbs were formed; in some instances, at the second change of the larva, when it passed into the pupa state; but in two or three instances no reproduction took place. At first view, this difference in the results might appear to favour the opinion that this reproduction of limbs depends on the

existence of parts especially adapted to perform this function, and which, in those experiments that had failed to exhibit the phænomenon, had been themselves removed. But the author found that in every instance of the mutilations thus practised, the perfect insect possessed a coxa, or basilar part of the limb; and this was the case even in those in which a new organ was not reproduced. From this fact, taken in conjunction with the formation of new entire limbs in the Iulidæ after the removal of every portion of the previous ones, the author infers that the power of reproduction resides in the whole of the organized tissues.

The author found that each newly produced limb is, in every case, composed of all its essential parts, namely coxa, femur, tibia, tarsus and claw; but its development is scarcely ever entirely normal, being either deficient in some of the tarsal joints, or irregular in the development of its armature.

The following are the general conclusions which the author deduces from his investigations. Slight wounds in the larvæ of insects always heal, except when the viscera have protruded, or excessive hemorrhage has occurred: severe wounds, such as those attending the excision of a limb, also frequently heal. It is when the wound is in the line of action of the principal muscles of the body that protrusion of the viscera takes place. For the healing of wounds, the first requisite is the arrest of the hemorrhage; and this is effected, as in the higher animals, by the coagulation of the blood, and the formation of a clot; and then a complete union of the separated parts takes place beneath the eschar formed by the clot. After this union, the reparation of the injury is commenced by a development, from the injured surface, of parts corresponding to those that had been removed. For the production of a new limb, one change of skin, at least, is necessary. The healing of the wound after the removal of a part, and the subsequent reproduction, although they do not prevent, yet certainly retard the natural changes. Lastly, the author has established the fact, that reproduction of lost parts takes place in metabolic as well as in the ametabolic articulata.

Feb. 6th and 13th, 1845.—"On the Structure and Development of the Blood.—*First Series.* The development of the Blood-Corpuscle in Insects and other Invertebrata, and its comparison with that of Man and the Vertebrata." By George Newport, Esq., F.R.C.S., President of the Entomological Society, &c. Communicated by P. M. Roget, M.D., Sec. R.S.

The author commences his paper by remarking, that he was led to the present inquiry by some curious facts relating to the blood of insects, which attracted his notice while engaged on the last paper he presented to the Royal Society, on the reproduction of lost parts in insects and Myriapoda. Some of these facts he is desirous of making known at once to the Society, preparatory to his offering them more extended researches on the blood of the Invertebrata, and its comparison with that of the higher animals.

The chief purpose of the author in the present paper, is to show the analogy which exists between the different corpuscles in the

blood of insects and of the Vertebrata, to trace the changes which the former undergo as compared with those of the latter, and to show that in development and function they are analogous to secreting cells.

In pursuance of this object, he premises a brief notice of what little was already known respecting the corpuscle in the Articulata, and of the different descriptions given of it by Carus, Spence, Wagner, Bowerbank, Edwards, Baly and some later observers, all of whom have described it differently, one only, Mr. Bowerbank, having correctly indicated its form.

He then proceeds to state, that while engaged on other observations in June last, he found that the oat-shaped corpuscles which are so abundant in the caterpillar state of the insect, almost entirely disappear before the insect has arrived at the perfect, or butterfly state, in which, a few days after the insect is fully developed, scarcely a single oat-shaped corpuscle is to be found; but that in the place of these, there are numerous very minute rounded bodies, spherules, and also many flattened, obtusely oval or barrel-shaped, double concave discs. Both these forms of corpuscle have molecular movements, which are most energetic in the spherules.

He next makes some general observations on the composition of the blood of the Invertebrata, and questions the accuracy of Professor Wagner's view in regarding the blood of these animals as analogous only to the chyle of the Vertebrata, at the same time stating his belief that it is not only analogous to true blood, but that it undergoes a continued succession of changes through the agency of the corpuscles. These minute bodies first derive nourishment, and the means of growth and increase from the fluid portion of the blood, and afterwards, when they have become fully developed, undergo dissolution, and help to supply the waste of the fluid that has been expended on the nourishment of the different structures, leaving other little bodies, which also undergo development, to assist in the further elaboration of this fluid. He states also, that the development of these latter bodies appears to have a certain relation to the type of each particular class of animals; and remarks that in the Vertebrata the size of the corpuscle is perhaps in a ratio inverse to that of the activity and extent of the function of respiration.

The author states that he has been led to these views, which appear to him to apply to animals generally, by an examination of the corpuscles, and by watching the changes which take place in the blood in lepidopterous insects, and he points out their accordance with those of Wagner, Henle, and Wharton Jones, with regard to the function of the corpuscles; but proposes to give the details on which his own view respecting the size of the corpuscle is founded on a future occasion.

He then enters more particularly on the consideration of the forms of corpuscle in the blood in the Articulata, which he marks as four; although, he observes, these are in reality only so many stages of development of one ultimate structure. These forms are,—*first*, the *molecules*, which he regards as comparable to the molecules observed

in the chyle of Vertebrata by Mr. Gulliver; *secondly*, the *nucleated* or *oat-shaped corpuscle*, which he believes with Wagner are analogous to the white or chyle corpuscles of Vertebrata; *thirdly*, the *spherules*, or minute rounded bodies developed from the oat-shaped corpuscle, and which he believes are analogous to the free nucleoli of Valentin, and probably to the very minute white, opake granules constantly observed in the blood of Vertebrata; and *lastly*, the *discs*, which are further developments of the spherules, and analogous to the true red blood-discs of the higher animals, and which, as he states in a subsequent part of his paper, in his examination of the blood of the human fœtus, he believes that he has also traced from the white, opake granules or spherules.

The author then proceeds to describe these forms of the corpuscle in insects more minutely, and enters into considerable detail with reference to the oat-shaped corpuscle, tracing it from its earliest distinct form, before any nucleus is perceptible in it; and shows that the nucleoli which constitute this body are gradually increased in number, until the corpuscle has attained its full size, when it first changes its form and becomes shorter, then rounded, and afterwards entirely breaks up and liberates the nucleoli that have been developed within it. This change of form he shows always takes place very rapidly in all the oat-shaped corpuscles, large and small, when out of the body, and to this circumstance he attributes the diversity in the descriptions that have been given by various observers of the form of the corpuscle. He shows also, that, with reference to the function of this body, the corpuscles are usually found in greatest number during the act of breaking up, immediately before the larva is preparing to change its skin, at which time the blood is extremely coagulable; and that there are fewest corpuscles, or that there is the greatest number of small corpuscles of this kind, soon after the caterpillar has again begun to feed. When the insect has assumed the pupa state, nearly the whole of these corpuscles are broken up. The greatest abundance of them are found in the act of changing on the third or fourth day of the pupa, after which the number of these corpuscles is gradually lessened, until, when the insect has entered the perfect state, very few remain. When the change to the perfect insect occurs, there is another opportunity of watching the function of this corpuscle. When the wings are being expanded and still soft, a few oat-shaped corpuscles circulate through them; but as the wings become consolidated, these corpuscles appear to be arrested, and break down in the circulatory passages, supplying directly the material for the consolidation of these structures, as appears to be shown in the entire arrest of circulation in these parts, and by the granular remains of the corpuscles which may be seen by transmitted light in a wing completely denuded of its scales on the upper and under surfaces. The *spherules* and *discs* of the perfect lepidopterous insect are then noticed, and some peculiar clavate or fiddle-shaped bodies, which appear to be the transition forms between spherules and discs, are pointed out as occurring in the blood of one of the night moths, *Xylophasia polyodon*, and also in the butterfly

soon after it has left the pupa state. These facts are regarded as proofs, by direct observation, of the function of the corpuscle, and of its analogy, both in function and development, to the secreting cells of glands.

In the second division of his paper, the author draws some comparisons between the blood-corpuscles of insects and the Vertebrata, and gives the details of a series of observations on the blood of a human fœtus that was born alive at the end of the sixth month. The blood of the parent, and of the placenta, was examined, and also of different parts of the body of the fœtus a few hours after death. The general results observed were, that the blood of the parent contained a very large quantity of white chyle corpuscles, and was extremely coagulable: the blood of the placenta contained, beside an abundance of chyle corpuscles, red blood-discs of extremely variable sizes, the largest being one-third or one-fourth larger than those of the mother, and the smallest scarcely more than one-fourth as large as the largest. There were also an immense abundance of molecules and nucleoli, from which latter the red blood-discs appeared to be developed. The blood of the vein and lungs presented a similar irregular condition as to size of the corpuscles, while that of the left auricle of the heart, aorta and arteries of the cord was more uniform in its character. From these observations the author concludes, that the blood of the Vertebrata is analogous in its mode of development to that of the insects and other Invertebrata, and that the red blood-discs are the ultimate developments of the opake white granules or nucleoli of the blood.

LINNÆAN SOCIETY.

December 17, 1844.—R. Brown, Esq., V.P., in the Chair.

Dr. Lankester, F.L.S., exhibited a specimen of an Agaric in which gills were developed on a portion of the surface of the pileus, directly over the stipes, resulting apparently from an extension of the growth of the stipes, and a rupture of the external membrane of the pileus, throwing up the internal or gill-producing membrane.

Read, "Additional Remarks on the *Spongilla fluviatilis*." By John Hogg, Esq., M.A., F.R.S., F.L.S. &c.

In this paper Mr. Hogg commences by claiming a priority to M. Laurent in the discovery of the locomotive germ-like bodies of *Spongilla*, and in comparing them with the spontaneously moving sporules of *Ectosperma clavata* of Unger. In proof of this priority he refers to his memoir, published in 1840, in the eighteenth volume of the Society's Transactions, in the first part of which, read before the Society on the 18th of December 1838, those bodies are described as having been observed by him in August 1838, and are compared with the locomotive sporules of the *Ectosperma*. An abstract of this part of Mr. Hogg's memoir appeared in the 'Proceedings' of the Society at the beginning of 1839, and was reprinted in the number of the 'Annals of Natural History' for March 1839. Of these several publications Mr. Hogg states that no notice is taken by M. Laurent